



## STATE & PRIVATE FORESTRY R5 FOREST HEALTH PROTECTION South Sierra Shared Service Area

**Report No. SS23-05**

**October 29, 2023**

**File Code: 3400**

**To:** Teresa Benson, Forest Supervisor, Sequoia National Forest  
Brandell Patterson, Western Divide District Ranger (*Acting*)

**From:** Region 5 State, Private, and Tribal Forestry, Forest Health Protection  
South Sierra Shared Service Area

**Subject:** Assessment of Fire-Injured trees from 2021 Windy Fire,  
Western Divide Ranger District, Sequoia National Forest

### Introduction

The 2021 Windy Fire burned over 97,500 acres across the Sequoia National Forest and Tule Indian Reservation (Tulare and Kern Counties). The wildfire was ignited by lightning storms and rapidly grew due to steep terrain and dense forests. It burned through several Giant Sequoia Groves in the Western Divide Ranger District: Long Meadow, Packsaddle, Deer Creek, Peyrone, South Peyrone, Cunningham, Starvation Creek, Red Hill, and part of Black Mountain Groves. Recognizing the urgency to mitigate hazard trees, reforestation efforts, and reducing fuel loads for future wildfire risk, treatments are being conducted by Forest Service and partners to protect residual trees including Giant Sequoias.

This summer residual green trees have been dying in the groves. Evidence of bark beetle and woodborer infestation have been found on true firs, sugar and ponderosa pines in burned stands – some of which with low crown or bole scorch. No sequoias have been observed to be killed by insects in affected groves. Forest Health Protection was requested to assess insect activity and discuss possible recommendations to reduce further mortality. Forest Health Protection (FHP)(Beverly Bulaon, Entomologist) joined John Gomez (Ecosystem Manager, Western Divide Ranger District) and Bill Morrison (Forester, Save the Redwoods League) to assess insect activity in three affected areas on October 11, 2023.

### Observations

Three stops were planned for viewing but extremely foggy conditions hampered visibility that the last stop at Deer Creek grove was canceled. The first stop at Long Meadow Grove (Township 22 S, Range 31 E, Section 33, 35, 27) was an area directly south near Trail of 100 Giants. The 2021 Windy Fire at this lower section of the grove was controlled at low to moderate levels, compared to upper slopes that burned at higher severity. Density reduction and hazard tree abatement treatments have been implemented throughout the groves since April this year and the Forest was concerned that recent insect activity on green trees was occurring as a result.

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At the first stop, several mature white fir and sugar pines were fully crown fading. Mature sugar pines here did not appear to have experienced high levels of crown scorch from the wildfire, and bole scorch was overall low. These low fire injuries are no guarantee that trees will not be attacked – just the probability (overall) mortality is lower post-fire. Sadly, several large (>30 inch) sugar pines in this unit were still successfully mass attacked. Red turpentine beetle was evidenced at the bases within burn scars, another indicator of cambium damage but not determinative of tree mortality (Owen et al. 2010). It was confirmed that these pines were attacked last year before treatment started and were likely trying to recover.

The second stop was at the upper backside of Long Meadow Grove where several ponderosa pine plantations were being thinned for stocking and removal of dead trees. Morrison mentioned that while dead trees were being removed, tree tops of green trees were discoloring. Knowing that pine engravers favor slash piles and smaller diameter trees, he was worried that treatments were attracting more beetles to the site. Some crowns completely turned red which was also troubling. In discussion with Morrison and their management of the generated slash, it did not seem that treatments were inciting beetles to the site. Walking around the larger unit, untreated pockets of mortality looked like they had been active for a few years prior to treatments. Many leave trees were still pitching profusely around burn scars, but overall bark beetle activity was low.

### **Discussion**

At its worst in the past two decades, drought conditions in the central California were categorized as “exceptional”. Last year in October, westside of the Sierras was exceptional drought and Earth 5<sup>th</sup> on record for hottest year – 2021 was 6<sup>th</sup> warmest ([www.noaa.gov](http://www.noaa.gov)). Conifers suffer long-after dry conditions have abated as hydraulic dysfunctions or deficits in carbon storage are symptoms of severe drought that persist (Breda et al. 2005). The combination of wildfire, drought, and warming temperatures is not an ideal situation for trees trying to survive and adapt to multiple disturbances. Bark beetles take advantage of these weaknesses and will seek out all host trees with lowered defenses. Dying trees noted on this visit were likely attacked the previous year, turning color the following year. Examining green trees at the sites, new 2023 attacks were few or re-attacks on already attacked trees. The abundant winter precipitation of 2022 help reinvigorate surviving trees setting back beetle population pressure.

True firs are especially susceptible to drought, their mortality often correlated with long or severe events (Oblinger et al. 2011, Stephenson et al. 2019). The mechanism which attracts insects to weak firs is not like those found in pines. Fir engraver (*Scolytus ventralis*), a primary bark beetle of true firs also competes with other pathogens and insects, so focused treatment against one damage agent is not practical. Firs are more vulnerable to hotter temperatures and lack of snowpack, particularly if they have prior pathogen infections or damage. Thus, promoting tree resiliency through adequate stocking densities or appropriate site conditions for their growth is the most effective strategy to reducing overall mortality (Egan et al. 2009). Current research suggest that historic stocking values should be further lowered to strengthen long-term resilience against wildfires and insects by greatly reducing competition between trees (North et al. 2022).

Mountain pine beetle (*Dendroctonus ponderosae*, MPB) has been consistently active in Sierra Nevada forests, even during times of good precipitation. This aggressive beetle has targeted scattered mature sugar pines that are often obscured in the landscape (Forest Health Monitoring [Region 5 - Forest & Grassland Health \(usda.gov\)](https://www.fs.fed.us/foresthealth/monitoring/region5/), Stephenson et al. 2019). Selected sugar pines are often those in very crowded forests even if dominant and overstory. Radial thinning around large sugar pines has often been used to reduce fuel ladders and improve growth

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conditions yet is not sufficient for bark beetle protection (Hood et al. 2022). If radial thinning is used in conjunction with additional prevention measures, then legacy sugar pines are better protected against MPB (Hood et al. 2022). This is similarly true for Ponderosa and Jeffrey pines: that radial thinning is only partially effective, and level of thinning must be intensive enough to significantly improve soil moisture holding capacity for old growth pines to respond (Hood et al. 2017). There is a low-cost prevention treatment that can be applied to high-value sugar pines to protect them against mountain pine beetle. Forest Health Protection can provide more information and potential assistance with this strategy.

Slash treatments often adhere to good practices that minimal damage by subsequent bark beetles is low. Pine engravers will attack the tops of pines during dry years, eventually taking entire trees if dry conditions persist or trees will be further attacked by more aggressive bark beetles. If good precipitation the following year after attacks occur, populations subside quickly. The activity at Long Meadow did appear to have calmed by the abundant winter rains, as remaining trees were pitching heavily, and no current year attacks noted. It is suggested to continue following slash treatment guidelines, being mindful of untreated slash if it remains on site during beetle flight times.

If there are further questions or concerns regarding this report, please do not hesitate to contact me.

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